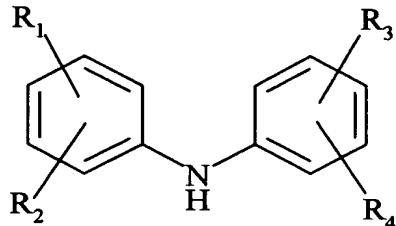


## CLAIMS

What is claimed is:

- 1      1. A process for producing alkylated diphenylamines of the general formula:



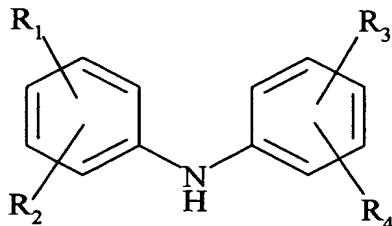
7      wherein  $R_1$ ,  $R_2$ ,  $R_3$ , and  $R_4$  are independently selected from the group consisting of hydrogen,  
8      oligomers of isobutylene, and oligomers of propylene, provided that at least one of  $R_1$ ,  $R_2$ ,  $R_3$ ,  
9      and  $R_4$  is not hydrogen, wherein the process comprises adding to a diphenylamine a mixture of  
10     oligomers of isobutylene or a mixture of oligomers of propylene in which said mixtures  
11     comprise highly reactive fractions, as well as fractions having lesser reactivity, in the presence  
12     of an acidic clay catalyst at a temperature low enough to prevent substantial deactivation of  
13     the catalyst until the addition is complete and then increasing the temperature to increase the  
14     alkylation rate of the less reactive fractions to yield a product that comprises 0.1 to 1%  
15     diphenylamine, <10% *tert*-butyl diphenylamine, <10% di-*tert*-butyl diphenylamine, <10%  
16     mono-octyl diphenylamine, >20% dodecyl diphenylamine, >15% hexadecyl diphenylamine,  
17     <10% eicosenyl diphenylamine, <7% tetracosenyl diphenylamine, < 4% octacosenyl  
18     diphenylamine and <2% polyisobutyl diphenylamine.

**0175-PA**

1       2.     The process of claim 1 wherein no more than 27% of the total reaction mixture is  
2     comprised of C<sub>8</sub> alkylation or less, and no more than 15% of the total reaction mixture is  
3     comprised of C<sub>24</sub> alkylation or more.

1       3.     The process of claim 1 wherein the isobutylene oligomer has a number average  
2     molecular weight of about 120 to about 600 and a methylvinylidene content of at least  
3     about 25%.

1       4.     An alkylated diphenylamine of the general formula:



wherein R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, and R<sub>4</sub> are independently selected from the group consisting of hydrogen, oligomers of isobutylene, and oligomers of propylene, provided that at least one of R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, and R<sub>4</sub> is not hydrogen, prepared by a process comprising adding to a diphenylamine a mixture of oligomers of isobutylene or a mixture of oligomers of propylene in which said mixtures comprise highly reactive fractions, as well as fractions having lesser reactivity, in the presence of an acidic clay catalyst at a temperature low enough to prevent substantial deactivation of the catalyst until the addition is complete and then increasing the temperature to increase the alkylation rate of the less reactive fractions to yield a product that comprises 0.1 to 1% diphenylamine, <10% *tert*-butyl diphenylamine, <10% di-*tert*-butyl diphenylamine, <10%

**0175-PA**

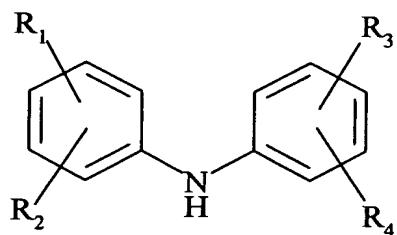
16 mono-octyl diphenylamine, >20% dodecyl diphenylamine, >15% hexadecyl diphenylamine,  
17 <10% eicosenyl diphenylamine, <7% tetracosenyl diphenylamine, < 4% octacosenyl  
18 diphenylamine and <2% polyisobutyl diphenylamine..

1 5. The alkylated diphenylamine of claim 4 wherein no more than 27% of the total reaction  
2 mixture is comprised of C<sub>8</sub> alkylation or less, and no more than 15% of the total reaction  
3 mixture is comprised of C<sub>24</sub> alkylation or more.

1 6. The alkylated diphenylamine of claim 4 wherein the isobutylene oligomer has a number  
2 average molecular weight of about 120 to about 600 and a methylvinylidene content of at least  
3 about 25%.

1 7. A composition comprising:

2 A) an organic product selected from the group consisting of lubricants, hydraulic  
3 fluids, metal-working fluids, fuels, and polymers; and  
4 B) a stabilizing amount of an alkylated diphenylamine of the general formula:



wherein R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, and R<sub>4</sub> are independently selected from the group consisting of hydrogen, oligomers of isobutylene, and oligomers of propylene, provided that at least one of R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>,

**0175-PA**

12 and R<sub>4</sub> is not hydrogen, prepared by a process comprising adding to a diphenylamine a mixture  
13 of oligomers of isobutylene or a mixture of oligomers of propylene in which said mixtures  
14 comprise highly reactive fractions, as well as fractions having lesser reactivity, in the presence  
15 of an acidic clay catalyst at a temperature low enough to prevent substantial deactivation of  
16 the catalyst until the addition is complete and then increasing the temperature to increase the  
17 alkylation rate of the less reactive fractions to yield a product that comprises 0.1 to 1%  
18 diphenylamine, <10% *tert*-butyl diphenylamine, <10% di-*tert*-butyl diphenylamine, <10%  
19 mono-octyl diphenylamine, >20% dodecyl diphenylamine, >15% hexadecyl diphenylamine,  
20 <10% eicosenyl diphenylamine, <7% tetracosenyl diphenylamine, < 4% octacosenyl  
21 diphenylamine and <2% polyisobutyl diphenylamine..

1 8. The composition of claim 7 wherein no more than 27% of the total reaction mixture of  
2 the alkylated diphenylamine is comprised of C<sub>8</sub> alkylation or less, and no more than 15% of the  
3 total reaction mixture is comprised of C<sub>24</sub> alkylation or more.

1 9. The composition of claim 7 wherein the isobutylene oligomer that is added to the  
2 diphenylamine has a number average molecular weight of about 120 to about 600 and a  
3 methylvinylidene content of at least about 25%.

1 10. The composition of claim 7 wherein the alkylated diphenylamine is present in  
2 concentrations of from about 0.05 to about 10.0 % by weight based on the material to be  
3 stabilized.

**0175-PA**

1        11.      The composition of claim 7 wherein the organic product is a lubricating oil.

1        12.      The composition of claim 7 wherein the organic product is an elastomer.